Connectivity: What it is and why it is so important

By recognizing the need to separate connectivity from applications we have the opportunity to unleash the power of the marketplace that has served so very well in computing and in the Internet. [Bob Frankston, 2001-01-29]

separateconnectivity.htm

History

Like any other system, our understanding of telecommunications has evolved and changed. In engineering the phone system, there were a myriad of technical problems to be solved in order to be able to carry voice conversations over long distances or even around the world. The signal had to be delivered with precise timing with every component of the network adjusted just right. Because the equipment was so expensive there was great emphasis on precise planning for capacity.

Similarly, television was an amazing feat of engineering in the 1930's. It took very precise engineering to synchronize the video beam in the kinescope (the camera) with the image shown in the receiver. Many technical tricks were used including interlacing so that successive scans filled alternating lines to produce a smoother image. People then took advantage of the accidental properties, such as adding closed captioning by using the "vertical blanking interval" (the time it took to move the beam from the bottom back to the top of the screen).

The rise of the Internet in the 1990's (though the process actually started decades earlier) has demonstrated that we can now treat both telephony and television as streams of bits over a packet network. In the network itself all packets are treated the same with no special handling for audio or video streams. The network doesn't even have the notion of a circuit since successive packets needn't go to the same destination.

Connectivity

The pragmatic definition: Connectivity is the unbiased transport of packets between two end points. This is also the essential definition of "IP" (Internet Protocol).

There is a strong boundary between the IP layer and the applications built upon it. TCP, for example, is an application protocol. In the term "TCP/IP" the slash emphasizes the separation of the two.

The virtuous cycle

Since no application's packets get special treatment, the IP layer created a new commodity, connectivity, and set in motion the virtuous cycle of low prices generating new applications. These applications generated new demand. The new capacity created to meet this demand drove down the unit price but generated higher aggregate revenue to the connectivity providers.

It is still difficult for many people to grasp the power of the virtuous cycle set in motion by an effective marketplace structure. In the 1970's the military paid millions of dollars for computers that were far less powerful than the machines we use for children's video games.

It also means that now telephony and television can be treated as streams of packets built upon the connectivity layer. There is a caveat in that we need sufficient capacity in our networks to carry this traffic. Early efforts to send audio and video over the Internet were limited by the capacity of the network but it is now becoming common and accepted to listen to live events over the Internet and, unlike radio, there is no predefined limit on the quality.